Coleophora adjectella Herrich-Schäffer, 1861 (Lepidoptera: Coleophoridae) — a species newly recognised as British.

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Summary. Coleophora adjectella is added to the British list on the evidence of specimens reared from larvae collected at Benfleet, Essex in October, 1967 and information derived from a paper by Karsholt & Nielsen (1978). The history and status of the *Coleophora milvipennis* group in Britain is reviewed.

The *Coleophora milvipennis* group as now understood consists of five closely related and very similar species: — *C. milvipennis* Zeller, 1839, *C. badiipennella* (Duponchel, 1843), *C. limosipennella* (Duponchel, 1843), *C. adjectella* Herrich-Schäffer, 1861 and *C. alnifoliae* Barasch, 1934. Their larval foodplants and feeding times are given below. *C. badiipennella* and *C. limosipennella* have been recognised as British since the middle of the nineteenth century (Stainton, 1854a; 1855). All the other three species have probably been collected in this country for as long a period, but *C. milvipennis* and *C. alnifoliae* were determined as *C. limosipennella* and *C. adjectella* as *C. badiipennella.* The situation was further complicated because the less closely related *C. trigeminella* Fuchs, 1881 was also confounded with *C. badiipennella* until it was recognised and introduced to the British list by Bankes (1912).

The earlier continental entomologists were as confused as their British counterparts until the present century when they unravelled the problem. *C. adjectella*, with which we are chiefly concerned here, was correctly described as a distinct species by Herrich-Schäffer (1861), but was then considered to be conspecific with *C. badiipennella* until Hering (1937: 410) restored it to specific rank. Hering (1957) gives the five species as they are here presented and their cases were figured by Toll (1962); his figures are reproduced on Plate XI.

British entomologists have been slow to follow the continental lead. The first attempt to add a third species to the traditional two was made by Barrett (1902). In October, 1900 W. C. Boyd (cousin of the better known T. Boyd) found two larval cases on *Prunus spinosa* during a shooting party at Danbury, Essex. He sleeved the cases out and reared a single moth in 1901. At first he determined it as *C. badiipennella* but was not satisfied and submitted it to Barrett for his opinion. Barrett compared the moth and its case with the continental material in the Frey collection at the British Museum (Natural History) and concluded that it was *C. milvipennis* which he accordingly introduced as a species new

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to the British list. He pointed out, however, that the known foodplant of *C. milvipennis* was *Betula* and not *Prunus*. Tutt (1902: 132) refers to Boyd's blackthorn specimen, stating that it "has been identified by Barrett as the birch-feeding *Coleophora milvipennis*", implying, perhaps, some degree of reservation. However, he continues to describe elsewhere the birch-feeding members of the group as *C. limosipennella* (1905: 58-59; 1908: 71 and 92). In the 1905 reference, where he is evidently describing *C. alnifoliae*, he states that the case on birch is "much more fragile and slender" than that on elm. The 1908 references describe *C. milvipennis*.

In the 1905 reference, Tutt incorrectly states that the case of *C. badiipennella* is three-valved. Possibly he had a case of *C. trigeminella* in front of him when he wrote, for Bankes, (*loc. cit.*) found the two species intermingled in the collections at the British Museum (Natural History). This led Bankes to examine the *C. badiipennella* there carefully and he concluded that the continental specimens in the Zeller and Hofmann collections were not conspecific with the British. The continental specimens, where a foodplant was cited, were reared from blackthorn whereas the British were from elm; he thought the British specimens to have their ground colour distinctly darker. He adds, "It is noteworthy that the only continental specimens I have seen, precisely identical with our British ones, are ten, standing in the Stainton Continental series of *badiipennella* and labelled as bred in 1870 from 'Elm, Paris, Ragonot'. Neither Bankes nor any of his contemporaries pursued his correct observations any further and, the Boyd specimen being by now forgotten, we in this country continued to treat the five species as if they were two.

The next British entomologist to study the problem was Professor Waters (1927; 1928). Though he followed current doctrine and supposed he had only two species, we can tell from his text that he found all five in the Oxford district. He was en excellent field-worker and was quick to see that there were more than two behaviour patterns. He sought a solution by accepting a suggestion made by Stainton (1859b: 104) that the larval life cycle extended over two years. If the larvae had two seasons in which to complete their growth but needed only about two months of active feeding to do so, it was likely enough that some would feed mainly in spring, others in summer and yet others in autumn. He concludes, "Several difficulties are thus explained away — the occurrence of larvae at all times in the season, the apparent irregularity in the appearance of the species and the contradictory statements made on the subject by different authors". Only one more summer remained before Waters' untimely death robbed us of our most brilliant microlepidopterist in this century. He had not solved the problem of the *C. milvipennis* group but, unlike his predecessors, he had appreciated that a problem existed. He had close contacts with leading European

entomologists, including Hering, and as an accomplished linguist (he was Professor of Romance Languages at Oxford University) communication presented him with no problem. Had he lived, research in this country would certainly have kept pace with that on the Continent.

The next contribution was made by Meyrick (1928). He wrote. "*C. milvipennis* Zell. has been recorded as British from a single specimen, which, however, seems to have been wrongly determined". He ascribed it accordingly to *C. badiipennella* whose foodplants he gave as "elm and blackthorn". In doing so he was following a long tradition. In one and the same year, Stainton had given the foodplants of *C. badiipennella* as elm (1859a: 384) and elm and blackthorn (1959b: 26-28; 32). In the latter work he was probably incorporating material from his European collaborators, Zeller and Frey, for, as we have seen above, most supposed continental examples of that species had been reared from *Prunus spinosa.* Morris (1872) mentions only elm but Meyrick in his first edition (1895) had already followed Stainton in adding blackthorn. Waters had determined the specimen he had reared from blackthorn as *C. badiipennella,* and he and Meyrick corresponded with each other. Meyrick, therefore, acted correctly in the light of the information available to him, but we see that, in spite of the misgivings expressed by Barrett, Bankes and Waters, we are no further advanced in 1928 than we were in 1859.

Mr. R. W. J. Uffen next turned his attention to the Coleophoridae and the unravelling of the tangle began. By the time Heslop (1961) produced his check-list, we find that *C. milvipennis* and *C. alnifoliae* are included and they also feature in Kloet & Hincks (1972) and Bradley & Fletcher (1979). However, they sidled into the British list unannounced. Ellerton (1970) writes, "*Coleophora alnifoliae* Barasch. Mr. R. W. J. Uffen's original discovery of this species, and the next [*C. milvipennis*], remains unpublished because of doubt of their distinctness". Here I join issue with my friend: Stainton's practice of airing his difficulties and inviting the collaboration of his contemporaries in seeking a solution is to be preferred. As the result all that British entomologists know of these two species is what they have picked up on the bush telegraph.

We now come to my own part in this saga. On the 20th of October, 1967 I was collecting at South Benfleet, Essex. Being anxious to add *C. badiipennella* to my collection, I took a number of its cases from the elms. Next I turned my attention to the blackthorns, where I also found cases of what I assumed to be the same species. Thinking ahead to the problem of overwintering and remembering that we had blackthorn but not elm in the garden, I returned the elm cases to their trees and took home and sleeved out the ones I had found on blackthorn. Most of the larvae survived the winter and completed their feeding in the spring. Eight

adults emerged in July, 1968 and I duly placed them, with one of their cases, in my collection as *C. badiipennella.* I added a ninth in 1971 from a spring larva, also found at Benfleet.

It may seem odd, but my first doubts over whether the elm and blackthorn-feeders were one and the same species arose out of my study of the Nepticulidae. On the 1st of September, 1974, once more at Benfleet, I came across unfamiliar gallery mines in leaves of elm. At first I thought I had come across a new nepticulid and then a new *Bucculatrix*, and was rather disappointed when the mystery larvae excised cases and I realised that all I had found was the early feeding of *C. badiipennella.* I thought it strange that I had never seen similar mines on blackthorn, and I have paid particular attention to that plant at Benfleet, both before and since. It was there that I discovered *Ectoedemia spinosella* (Joannis) (Emmet, 1970) and, more recently, that Paul Johnson and I studied the hitherto unknown pre-hibernation history of *Paraswammerdamia spiniella* (Hübner) (Emmet, 1976). If ever blackthorns have been looked at hard by an entomologist, they are those at Benfleet and I can say with confidence that the coleophorid on *Prunus* does not make an early mine which is similar to that of its counterpart on *Ulmus.*

The final piece of the jigsaw puzzle fell into place when, after receiving a letter from Mr. Ole Karsholt of Denmark suggesting an interchange of "separates" and after the exchange had taken place, I found myself in possession of a paper (Karsholt & Nielsen, 1978) which included a review of the *Coleophora milvipennis* group in Denmark. In it there was a description of a species I had never even heard of, *Coleophora adjectella*, whose foodplant was *Prunus spinosa.* In a flash I realised that the problem was solved. The paper contains figures of the genitalia of each sex of all the species and keys based on the male and female genitalia. I took my series, together with the paper, to the British Museum (Natural History), where Dr. J. D. Bradley dissected a male and female and pronounced that they were indeed *C. adjectella.* We looked out the Boyd specimen and placed it, together with my two dissected moths, in the British collection over the appropriate label. Waters' specimen in the Hope Department of Entomology at Oxford University should likewise be relabelled. He collected the larva on the 6th or 7th of October, 1926 at Shabbington Wood, Buckinghamshire and the moth emerged on the 10th of July, 1927. There may well be other specimens of *C. adjectella* in British collections, but I do not know of them.

I do. however, know of two other localities. On the 11th of September, 1977 I was with Raymond Uffen at Stow Maries Halt Nature Reserve, near Maldon, Essex when he found a case; a few days later, on the 18th of September, when we were both collecting with a group of entomologists in the

Isle of Wight, I found another, which I gave to Raymond, at Newton Ranges. It is, therefore, known already from vice-counties 10, 18 and 24. Hering (1957) describes it as a rare species and this seems to be true in Britain too. Karsholt & Nielsen (1978) introduced it as new to the Danish list.

I shall now give a brief account of the five species. Since the adults cannot be separated reliably on superficial characters, I shall refer the reader to Meyrick (1928) for the description of the common wing pattern; it is, however, worth while remembering that Bankes found the forewing in *C. badiipennella* to be darker than in *C. adjectella. C. milvipennis, C. limosipennella* and *C. alnifoliae* are larger species (wingspan 10-14 mm.), where as *C. badiipennella* and *C. adjectella* are smaller (wingspan 8-10 mm.).

Toll's figures of the larval cases should prove useful. His figure of *C. adjectella* is taken from Hering (1957), perhaps indicating that it is rare or hard to obtain in Poland. Waters (1928) draws attention to the somewhat truncate anal end of the case. Most examples I have seen of the case of *C. badiipennella* have the oral orifice bent over more distinctly in relation to the tube and the "neck" more strongly developed, as in the figure of *C. limosipennella.* Some cases of *C. limosipennella* are broader in relation to their length than the one figured. The depicted case of *C. alnifoliae* is probably constructed from a mined alder leaf. In Britain the usual foodplant is birch and then the case is not much larger than that of *C. milvipennis.* All the cases are bivalved and are usually excised from the margin of the leaf, hence showing its serrations.

C. limosipennella. Adult in June; wingspan 11-13 mm. Larva on *Ulmus*, monophagus. It appears in July, sometimes in large aggregations and principally on saplings, often those growing in hedgerows. Stainton (1859b: 102) wrote, "The young larva of this species has not yet been observed; probably it may have escaped notice on account of the difficulty there may be in distinguishing it among the multitudes of larvae of *Fuscedinella* [*C. serratella* (Linnaeus)]." Suprisingly, this remained true for another 120 years and in Emmet (1979: 81) Raymond Uffen wrote, "Small larvae may be expected to occur in autumn, but have not been found": that is, until a week after the publication of these words. On the 1st of November my wife and I were making records for the forthcoming list of Essex Microlepidoptera at Purfleet, beside the Thames estuary. There she picked a spray of elm which revealed the whole prehibernation history of two larvae. The ova were not visible but apparently had been laid in the angle of the midrib and a vein, where they were concealed by the hairs which fringe the midrib. The mine is very much smaller than that of *C. badiipennella*, being about 4.0-5.0 mm. long and 1.0 mm. wide, directed outwards alongside a vein. Most of the frass is ejected through a hole in the underside but remains adhering to the lower surface of the leaf. The

first case is excised from the distal end of the mine. It is very small, measuring only about 2.0 × 1.0 mm., oval in shape and bivalved; the neck is weakly developed and the mouth angle about 20°. The larvae feed only briefly in their first case, still on their first leaf, before excising the second case; this is taken from a mine in the centre of the leaf with the first case left adhering to the edge of the cut-out, in the example I studied one on the upperside and the other on the underside. The second case is similar in pattern to the final case but very much smaller, being, in fact, hardly larger than the first case of *C. badiipennella*. It was not possible to determine which of the mines were made before and which were made after the excision of the second case, but if any feeding at all took place after this event, it was minimal. The larvae had then fixed themselves for overwintering on the twig near the base of the petiole of the leaf on which they had fed; each had moved, in fact, less than two inches from the presumed position of the ovum. A second leaf picked from the same hedgrow sapling told the same story. The main differences from *C. badiipennella* are the smaller mine, the ejection of frass, the absence of silk within the mine, the much smaller first case and the fixation for overwintering in an early instar. There is no possibility of confusing the early case of *C. limosipennella* with that of *C. serratella*, for a description of which see Raymond Uffen's introductory note to the *serratella* group (Emmet, 1979: 80). It is now certain that the life cycle lasts two years. There is still a gap in our knowledge of the larval habits in spring; the larvae make an apparently sudden appearance on the elms in their final cases in midsummer, when their large mines are very conspicuous. The full-grown larva then overwinters a second time, generally low down. I kept a colony at Saffron Walden under observation in 1964-1965. When the cases had been fixed for the winter, I marked their position by tying snippets of red string round the branches. In early spring gipsies camped on the precise spot and the smoke from their fire killed or drove away nearly all the larvae!

C. badiipennella. Adult in June; wingspan 8-10 mm. Larva mainly, if not solely, on *Ulmus*. However, the figure in the original description (Duponchel, 1843: Pl. 78, fig. 14) is stated to have been made from a moth reared from *Acer*. Stainton (1859b: 30) recorded it on *Fraxinus* as well as *Ulmus*, but Bankes (1912) wondered whether the records on *Fraxinus* were not referable to *C. trigeminella*. The early mine has been mentioned above. It is long for that of a coleophorid, generally follows a vein outwards and has the early part almost filled with frass. The later part, when the mine is held up to the light, looks brownish and is slightly opaque, no doubt as a result of being lightly spun with silk. The case itself, cut from the distal end of the mine, is, of course, heavily silk-lined. The larvae feed up in the autumn

and normally overwinter full-fed. Possibly some larvae feed again in the spring, but reports to this effect may be due to confusion with *C. adjectella.* Final case 5-6 mm. long, the smallest of the group.

C. adjectella. Adult in July; wingspan 8-10 mm. Larva on *Prunus spinosa,* possibly monophagus but Hering (1957) also gives *Crataegus.* Overwinters half-fed and completes its growth in the spring. Mr. R. Fairclough and I collected several larvae at Benfleet on the 1st of October, 1979. Some were still in their first cases; these were small, flat and almost rectangular, and were fixed vertically to the leaves. I found excisions on the margin of leaves corresponding to this shape, but there was no preliminary mine or positive evidence that these were the source of the first case. The early stages are well described by Waters (1928). Waters gives the length of the final case at 4.5-5.0 mm.; Karsholt & Nielsen state that it is about 8 mm. long; my own mounted example measures 7 mm. Though variable, it is the second smallest of the group.

C. milvipennis. Adult in June; wingspan 10-13mm. Larva on *Betula* but Karsholt & Nielsen give *Alnus, Carpinus, Corylus* and *Myrica* as additional foodplants. Alder-feeding larvae received by Stainton on the 23rd of August, 1853 may have been this species (Stainton, 1854b: 133). Feeds in the autumn and normally overwinters full-fed; records of its feeding again in the spring may be due to confusion with *C. alnifoliae* or may be of parasitised larvae, which suffer from induced starvation and therefore behave abnormally (*cf.* Tutt, 1905: 128 on *C. fuscocuprella* Herrich-Schäffer). When rearing this species I have never given my larvae the opportunity to feed again and the adults have emerged satisfactorily. The larvae are nomadic; their feeding-places are often conspicuous on birches but no cases are to be found nearby. For this reason I have found it best to search on the smallest saplings where their range of movement is perforce restricted.

C. alnifoliae. Adult in late June to August; wingspan, according to Karsholt & Nielsen 11-14 mm., which is larger than supposed specimens reared in Britain from birch. Karsholt & Nielsen give *Alnus* as the only foodplant but Hering (1957) adds *Betula.* So far in this paper I have been following the little English tradition there is and have treated the material that feeds on birch in spring as *C. alnifoliae,* but now it is time to point out that this may not be correct. Newton (1979) expresses doubt and he has reared adults from both foodplants.I am at a disadvantage, never having found cases on alder. The Danish authors give the length of the case of *C. alnifoliae* as 10-13 mm., but cases on birch do not exceed 10 mm. Newton also draws attention to this dfference in size, and adds that the cases on birch are inclined at a steeper angle to the leaf. I have found the cases on birch in a number of places and notably at Barton Mills

in Suffolk. Having already noted their presence, I went there with Raymond Uffen and Paul Johnson on the 31st of May, 1976 and we collected many larvae. From these, I reared 15 moths between the 21st of June and the 2nd of July (it was an early season), and no doubt the others each bred a series. More usually the larvae are found singly or in small numbers. I can see no superficial difference between my "*C. alnifoliae*" and the *C. milvipennis* I have reared from larvae that completed their feeding in the autumn. Newton, however, found that the alder-feeding specimens were ferruginous brown, whereas those from birch were light brown. There seem to be three possibilities.

(1) The birch-feeding larvae are *C. alnifoliae* but feed in smaller cases and produce smaller, paler moths than those on alder. This can be regarded as the currently orthodox British opinion.

(2) They are *C. milvipennis*, which has two alternative larval time-cycles, one in which the larvae feed up in the autumn, and the other in which they overwinter in an early instar and complete their growth in the spring.

(3) The alder- and birch-feeders constitute two distinct species, the latter being as yet unamed.

My own guess is that the truth lies somewhere between (2) and (3). I doubt whether the two time-cycles are to be found in the offspring of the same female. I know of five localities in Essex for birch-feeding "*C. alnifoliae*" and three for *C. milvipennis*, but have found both at only one site. This suggests that the two are normally allopatric. Is it not possible that this is an example of species differentiation in the making? I hope some entomologist with the scientific training and skills which I lack will take up this problem which ought not to present great difficulty. I could probably provide him with living birch-feeding "*C. alnifoliae*" but not, on my present knowledge of distribution, with material from alder. Pending such research, I propose diffidently to adhere to possibility (1) above. This seems also to be the standpoint of Chalmers-Hunt (1975).

The keys to the female and male genitalia which follow are those of Karsholt & Nielsen, reproduced with their kind permission. I am most grateful to Dr. K. Sattler who has translated them from the Danish. He has also made one or two modifications after consultation with the Danish authors. The genitalia are figured by Karsholt & Nielsen (1978) and the references to their figures are retained for the benefit of readers who use the two papers in conjunction.

Key to the *Coleophora milvipennis* group based on female genitalia

1 Sternum VIII with short spines; signum a short thorn without base plate (Fig. 22) . . . *C. adjectella*
– Sternum VIII without spines; signum composed of thorn on base plate (Figs. 21, 23-25) 2

2 Sternum VIII with distinct, emphasised, continuous, curved border between anterior strongly sclerotized part and posterior part; signum a straight thorn without teeth (Fig. 23) . . . . . *C. alnifoliae*
– Sternum VIII without curved, continuous edge; thorn of signum with teeth along one side (Figs. 21, 24, 25) 3
3 Ostium bursae with ventral lobe bearing isolated setae; posterior part of ductus bursae narrow, with parallel margins, without spines (Fig. 25) . . *C. badiipennella*
– Ostium bursae without ventral lobe; posterior part of ductus bursae baggy, with spines (Figs. 21, 24) 4
4 Sternum VIII evenly sclerotized; base plate of signum small, irregular; thorns of varying length but always strong and thick (Fig. 21) . . *C. limosipennella*
– Sternum VIII with strongly sclerotized folds laterally and in a nearly square field anterior to ostium bursae; signum composed of large, round base plate with irregular margin and long, slender thorn (Fig. 24) *C. milvipennis*

Key to the *Coleophora milvipennis* group based on male genitalia

1 Aedaegus with distinct conical or club-shaped cornutus which bears numerous small spines (Figs. 18,19) 2
– Aedeagus with group of poorly defined shorter or longer spines (Figs. 15-17) 3
2 Valvula overlaps upper margin of sacculus (Fig. 18) . . . . . *C. alnifoliae*
– Valvula reaches only middle of valva (Fig. 19) . . . . . *C. badiipennella*
3 Pair of distal tips on apex of sacculus very close together (Fig. 15) . . . . . *C. limosipennella*
– Pair of distal tips on apex of sacculus clearly separate (Figs. 16, 17) 4
4 Valvula extends at most half across valva (Fig. 16) . . . . . *C. adjectella*
– Valvula extends more than half across valva (Fig. 17) . . . . . *C. milvipennis*

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A New Locality for Yponomeuta irrorella (Hbn.) in Kent. — At the meeting of Kent lepidopterists at Maidstone Museum on March 22nd this year, I took along a selection of micros I had not identified, and among them the Editor confirmed that I had two specimens of *Y. irrorella* from a locality hitherto unknown for this very local species. I had beaten them from a hedgerow above the Old Chalk Pit between Burham and Wouldham (TQ 72/63) on June 21st 1976. — Alfred J. Butcher, 28, The Fairway, Rochester, Kent.